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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/574,837	04/06/2006	Mitsuhiro Horio	P29478	5021

7055 7590 12/10/2008

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EXAMINER	
LACLAIR, DARCY D	

ART UNIT	PAPER NUMBER
1796	

NOTIFICATION DATE	DELIVERY MODE
12/10/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/574,837	HORIO ET AL.	
	Examiner	Art Unit	
	Darcy D. LaClair	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *9/9/08*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5, 7-10, 12-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5, 7-10, 12-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. All outstanding rejections, except for those maintained below are withdrawn in light of the amendment filed on 9/9/2008.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Upon reconsideration of the claims and an updated search, new grounds of rejection are set forth below which were are not necessitated by applicant's amendment. Thus, *a 2nd non-final Office action is set forth as follows.*

Claim Objections

2. **Claims 1, 4 and 9** are objected to because of the following informalities:

With regard to **Claims 1, 4, and 9**, parentheses appear in the claim containing a content of aromatic vinyl compound units and a definition of block T. Generally, the contents of the claim should be a limitation, not a definition or clarification. Appropriate correction is required.

Claim 1 is objected to because it recites, for block B2, less than 90% by weight ***or*** not less than 3% by weight. This appears to give the endpoints of a range, and would therefore be more appropriately linked with "and."

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claim 1** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, the claim now requires "a hydrogenated aromatic vinyl compound that is randomly copolymerized with a diene compound." But this is not supported by the disclosure as originally filed. Thus, note page 19, line 3 of the specification which recites (a) hydrogenating a (pre)formed polymer formed by random copolymerization of an aromatic vinyl compound and a conjugated diene. This indicates that claim 1 is in violation of the written description requirement in two ways. First, the claim recites a prehydrogenated aromatic vinyl compound when, in fact, hydrogenation is conducted subsequent to the formation of a random copolymer. Second, the scope of the claim encompasses any diene (including a non-conjugated diene) when, in fact, only a conjugated diene is supported. With respect to the hydrogenation issue identified above, it is noted that the applicant exemplifies hydrogenation of the conjugated diene unit during the post polymerization hydrogenation treatment. (see p. 59-60, par [0088]-[0089]) This suggests that the aromatic vinyl compound is not only not hydrogenated prior to polymerization, but that the hydrogenation treatment does not affect the aromatic vinyl content of the random copolymer.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1-5, 7-10, and 12-13** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Doki et al**. (**US 2002/0115790**) in view of **Shibata et al**. (**US 5,191,024**)

Claim 1 now requires a polyoxymethylene resin comprising

(A) 10-99.5 parts of a polyoxymethylene resin

(B) 0.5 to 90 parts by weight of a block polymer having block B1) composed mainly of aromatic vinyl compound units and block B2) having hydrogenated aromatic vinyl that is randomly copolymerized with a diene compound, having a vinyl content of 50 to 90% by weight and the main dispersion peak of tan δ at 60°C or below, and

optionally **(C)** 0.5 to 90 parts by weight of a polyolefin resin.

Doki teaches a polyoxymethylene resin composition which comprises **(I)** 100 parts by weight of a polyoxymethylene polymer and **(II)** 1-200 parts by weight of a thermoplastic elastomer with the main dispersion peak temperature of -30°C to 50°C. (see abstract, par [0007]) Doki later teaches that the preferred thermoplastic elastomer (II) comprises a vinyl aromatic monomer, and preferably a copolymer of a styrene monomer and a diene monomer copolymerized with the styrene monomer, preferably with at least two polymer segments (or blocks).

(see par [0032]-[0034]) Doki further exemplifies a block copolymer which has been hydrogenated (see par [0093]) Doki ***fails*** to teach a block copolymer specifically having a randomly copolymerized block comprising hydrogenated aromatic vinyl and diene.

With regard to applicant's **(B)**, **Shibata** teaches a hydrogenated diene block copolymer which is a hydrogenation product of an (A)-(B) block copolymer in which (A) means an alkenyl aromatic compound polymer block and (B) means an alkenyl aromatic compound-conjugated diene random copolymer block where the content of the vinyl content of the conjugated diene portion is 15% or more. (see abstract) This is consistent with applicant's indication that the content of vinyl compound units in B1 should be less than 90% by weight and not less than 3% by weight. Shibata teaches that the weight portion of the alkenyl aromatic compound to the conjugated diene in the total monomers is 5/95 to 60/40. (See col 2 line 58-59) This includes the range from 50%-60% aromatic vinyl compound, which is within the range 50% to 90% required by applicant. With regard to the hydrogenation, Shibata teaches that degassed and dehydrated cyclohexane, styrene, and n-butyllithium were added to a reactor and subjected to polymerization. Further polymerization was conducted while continuously adding 1,3-butadiene and styrene simultaneously. When the conversion was approximately 100%, additional catalyst was added and the mixture was subjected to further reaction, cooled, stripped, and dried to obtain a hydrogenated diene block copolymer. (see Example 1, col 18 line 59-col 19

line18) While significantly more detailed, this appears to follow the same process and use the same catalysts, where they were named by applicant. (see applicant's specification p. 59-60, polymer b-1 and b-2 preparation) Additionally, Shibata demonstrates that varying amounts of total styrene content can be achieved by varying amount added during the first stage and second stage of polymerization (see Examples, Table 1, 2) Based on the similarity of components used, as well as the polymerization procedure used to generate this compound, it is the examiner's position that this compound would share a main dispersion peak consistent with that of applicant's compound (B).

Shibata teaches the inventive hydrogenated diene block copolymer is useful for polar or non-polar resins, (see abstract) specifically including polyoxymethylene (see col 11 line 11) and indicates that it can be used as a modifier for various resin and is useful as a material for automotive or electronic parts, films, sheets, etc. (see col 7, line 23-26) Shibata further teaches that the inventive hydrogenated block copolymer provides a modifier for resins which provides good low temperature impact resistance, paintability, and flexibility. (see col 1 line 43-50) Doki's invention is a polyoxymethylene resin with a block copolymer useful for components in appliances, machines, and automobiles. (see abstract) Based on the similar fields of endeavor and end use, as well as the similar overall compositions, it would be obvious to replace the block copolymer in use by Doki with the block copolymer of Shibata in order to appreciate the benefits it provides when used as a modifier in a composition.

The combination of Doki and Shibata, as discussed above meets the requirements of the claim as presented, in the case where the polyolefin is not required, but optional.

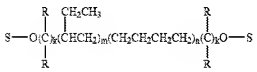
Nevertheless, with respect to component **(C)** of claim 1, Doki additionally teaches that the polyoxymethylene resin composition may contain 1 - 100 parts by weight of a polyolefinic resin. (see par [0008]) Shibata also teaches that an olefin resin may be blended with the hydrogenated diene block copolymer in order to obtain a polyolefin type thermoplastic elastomer composition suitable for low-hardness applications and superior fatigue resistance, mechanical properties, moldability, and appearance. (see col 9 line 43-45) This indicates that the copolymer of Shibata is likewise compatible with a composition including polyolefin. While not required, this meets the requirement for component (C) of claim 1.

Claim 2 requires the additional presence of **(D)** 0.1 to 30 parts of a silicone grafted polyolefin resin per 100 parts by weight of the sum of parts (A), (B), and (C). Doki teaches 0.1 to 30 parts by weight of a lubricant, (see par [0008]) which can be a silicone-grafted polyolefinic resin. (see par [0037])

Claim 3 recites **(E)** 0.05 to 20 parts of a lubricant and/or **(F)** 0.1 to 150 parts of an inorganic filler per 100 parts by weight of (A), (B), and (C). Doki teaches 0.1 to 30 parts by weight of a lubricant. (see par [0008]) Doki also teaches other additives, including inorganic fillers such as glass fibers, talc, wollastonite and hydrotalcite, electrically conductive carbon black, pigments, and others. (see par [0048]) Doki is

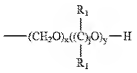
silent as to the percentage content of these inorganic fillers. Applicant has claimed a broad range which encompasses a range well known in the art for inorganic fillers, and addition of fillers is result dependant variable. Specifically, the content of filler will yield the desired property such as color, conductance, physical properties, processability, or the like. See MPEP § 2144.05 (B). Case law holds that "discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 4 and 9 recite a polyoxymethylene resin where the resin comprises a polyoxymethylene block copolymer (A-1) having an average molecular weight of 10,000 to 500,000, represented by the formula



(1)

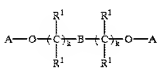
Where the portion other than S is a hydrogenated liquid polybutadiene residue having a hydroxyalkyl group at each end with a molecular weight 500 to 10,000 and m and n are both 2-98% by mole, and n + m = 100 mole percent. The repeating units may be random or block. R may be hydrogen, alkyl groups, substituted alkyl groups, aryl groups and substituted aryl groups.



(2)

and S is

where R1 is hydrogen, alkyl groups, substituted alkyl groups, aryl groups and substituted aryl groups. Each k, and j may be an integer 2-6. x = 95-99.9% by mole, y = 5 to 0.1% by mole, and x+y = 100% by mole. **Doki** teaches a preferred polyoxymethylene block copolymer (i-2) with an average molecular weight of 10,000 – 500,000 represented by the formula



(1)

(2)

where A is

(Optionally with a terminal group ending in -O-H):

And B is a hydrogenated polybutadiene having 2-98 mole % 1,2-bonds and 2-98% 1,4 bonds being present in the polymer chain either in random or in blocks. Here, Doki's 1,2 bonds are the "m" group of the instant application, and Doki's 1,4 bonds are the "n" group of the instant application. Doki's B group is identical to the "portion other than S" of the instant application. Here, A is a genus of the instant application's formula (2), with the form containing an optional terminal group representing the same species. Doki's R1 corresponds to the instant application's "R" and is be hydrogen, alkyl groups, substituted alkyl groups, aryl groups and substituted aryl groups. Doki's R2

corresponds to the instant application's "R1" and is be hydrogen, alkyl groups, substituted alkyl groups, aryl groups and substituted aryl groups. Further comparison may be made in column 1, paragraph 14-18, however the essence is that these two polymers are identical in scope.

Claims 5 and 10 recite a polyoxymethylene resin composition of the (A-1) resin of **claim 4 and 9**, respectively, and (A-2) a polyoxymethylene copolymer with oxymethylene groups as its main repeating unit and oxyalkylene groups of 2 or more carbon atoms in an amount of 0.1 to 10% by mole are used in combination, and the A-1/A2 ratio is 10 – 100. Doki teaches that the second group of the polyoxymethylene (i-1) has oxymethylene groups as the main recurring unit and contains an oxyalkylene group of 2 or more carbon atoms in an amount of 0.1 to 5 mole %. (see par [0013]) Doki further teaches that the ratio of i-1 (corresponding to A-2) to i-2 (corresponding to A-1) can be in the range 0/100 to 95/5. This corresponds to a ratio of 0.05 to 100 of A-1/A-2. (see par [0018]) This encompasses the entire range recited by applicant.

Claim 7 and 12 require that the polyolefin resin be obtained by modification with a α,β-unsaturated carboxylic acid and/or an acid anhydride thereof. Doki teaches generally that a variety of polyolefinic resins are available and can be modified with unsaturated carboxylic acids. (see par [0044]) Specifically, Doki exemplifies a maleic anhydride modified ethylene-butene copolymer as the polyolefinic resin. (see par [0103])

Claim 8 and 13 recite a molded or shaped article obtained by molding, cutting, or both. Doki indicates that the moldings are made from the resin, and the moldings can be further shaped by cutting. (see par [0050])

5. **Claims 1-5, 7-10, and 12-13** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Doki et al.** in view of **Shibata et al.**, further in view of **Hahn**. (**Modern Styrenic Polymers, 2003**)

The discussion with regard to **Claim 1**, above in **paragraph 5**, is incorporated here by reference.

With regard to Claim 1, the combination of Doki and Shibata teach a hydrogenated diene content for the block copolymer comprising an aromatic vinyl unit and a unit composed of hydrogenated aromatic vinyl compound randomly copolymerized with a diene compound. Specifically, Shibata teaches 80% saturation of the double bonds of the conjugated diene portion of the copolymer. (see Shibata abstract) Although Shibata teaches a process similar to applicant's for hydrogenation of the copolymer, namely polymerization of styrene, followed by polymerization of a mixture of butadiene and styrene (see col 18 line 59-68), Shibata fails to specifically indicates that there would be hydrogenation of the styrene by the catalytic process later employed. (see col 19 line 5-18) Hahn teaches polystyrenes which are the hydrogenation product of polystyrene and poly(cyclohexylethylene) for the purpose of improving the oxidative and radiation induced degradation stability of polystyrene. (see p. 533) This type of copolymer is capable of retaining good physical properties after

exposure to weathering. (see p. 549 par 3) Hahn teaches complete hydrogenation of block copolymers of styrene with diene monomers, (see p. 547) as well as catalysts for performing this action. (see p. 548 par 3) It would be obvious to include application of the catalyst known to hydrogenate the styrene component of the block copolymer, in order to achieve hydrogenation of the styrene component and take advantage of the known improvement in properties.

With regard to Claims 2-5, 7-10, and 12-13, see the arguments laid out in **paragraph 5**, above.

Response to Arguments

6. Applicant's arguments filed **9/9/08** have been fully considered. Specifically, applicant argues (A) The rejection under 25 U.S.C. §112, 2nd of Claims 1, 6, 9, and 11 has been addressed by the amendments, (B) Doki fails to anticipate claims 1-5, 7-11, and 12-13 because the thermoplastic elastomer of Doki's invention does not employ a randomly copolymerized elastomer, where as the claimed invention requires a thermoplastic elastomer containing a block composed of a hydrogenated aromatic vinyl compound that is randomly copolymerized with a diene compound, and (C) Doki evidenced by Kuraray fails to anticipate claims 6 and 11. Further, claims 6 and 11 have been cancelled.

With respect to argument (A), applicant's arguments have been considered, and are withdrawn in light of the amendment to **claim 1**, from which **claim 9** depends and cancellation of **claims 6 and 11**.

With respect to arguments (B), applicant's arguments have been considered, but are ***moot*** in view of the new grounds of rejection.

With respect to arguments (C), applicant's arguments have been considered and the rejection is withdrawn in light of the cancellation of **claims 6 and 11**.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Darcy D. LaClair whose telephone number is (571)270-5462. The examiner can normally be reached on Monday-Thursday 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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